

The Status of Aquatic Associated Birds in LMNRA: 2004–2013



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Research Projects

- Aquatic Bird Inventory and Monitoring: 2004–2009
 - Standardized monthly surveys at 8 sites
- Snowy Plover Breeding Surveys: 2007–2009
 - Monitored 2 breeding areas
- Peregrine Falcon Population Assessment: 2004–2010
 - Determined population size and breeding density
 - Assessment of prey base
- Bald Eagle Annual Mid-Winter Surveys
 - Standardized in 2007
- Mercury Assessment of Peregrines and Prey: 2012–2013
 - Hg levels in peregrines and 87 prey species



Historical Perspective



O'Sullivan 1871



2010

Historical Perspective



Aquatic Bird Monitoring Results

- 364 monthly surveys of 8 regular sites
- 243,081 birds tallied overall
- 94 species of aquatic birds represented



Most Abundant Aquatic Bird Species



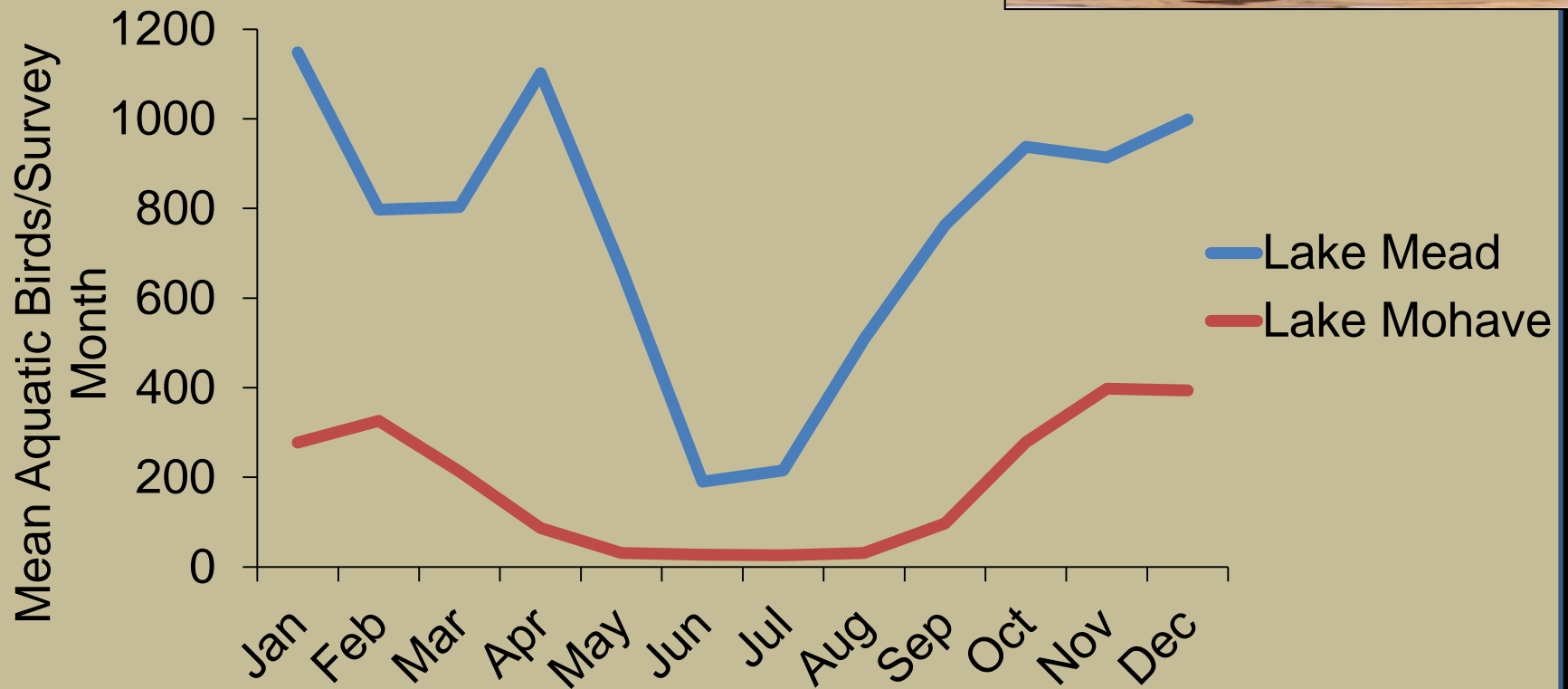
Predominant Species	Total
American Coot	58,843
Eared Grebe	50,632
Clark's/Western Grebe	30,111
Ring-billed/CA Gull	19,570
Green-winged Teal	9,630
Ruddy Duck	7,728
American White Pelican	6,089
Least/Western Sandpiper	5,880
Northern Shoveler	5,700
American Avocet	4,928

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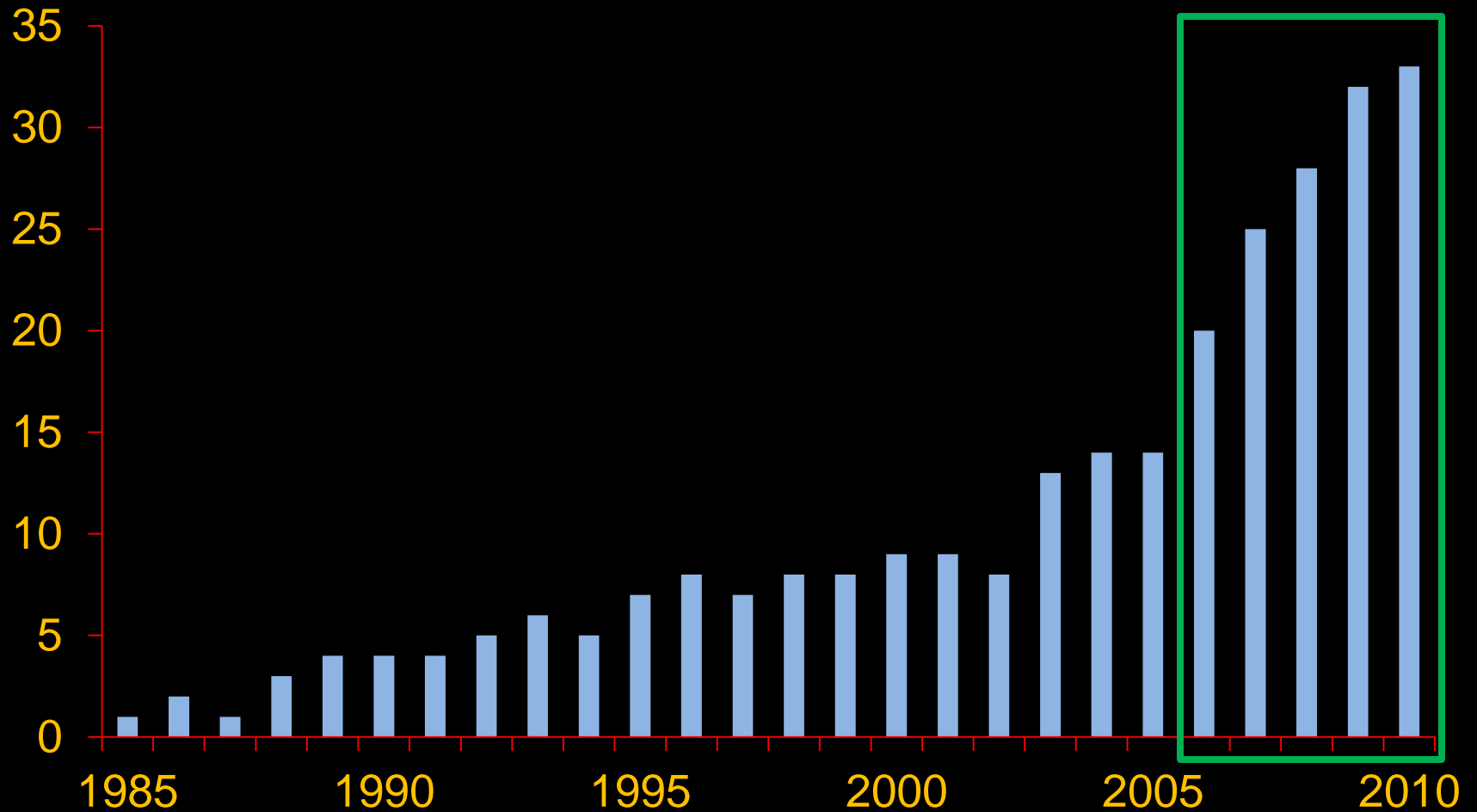


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Aquatic Bird Seasonal Variability



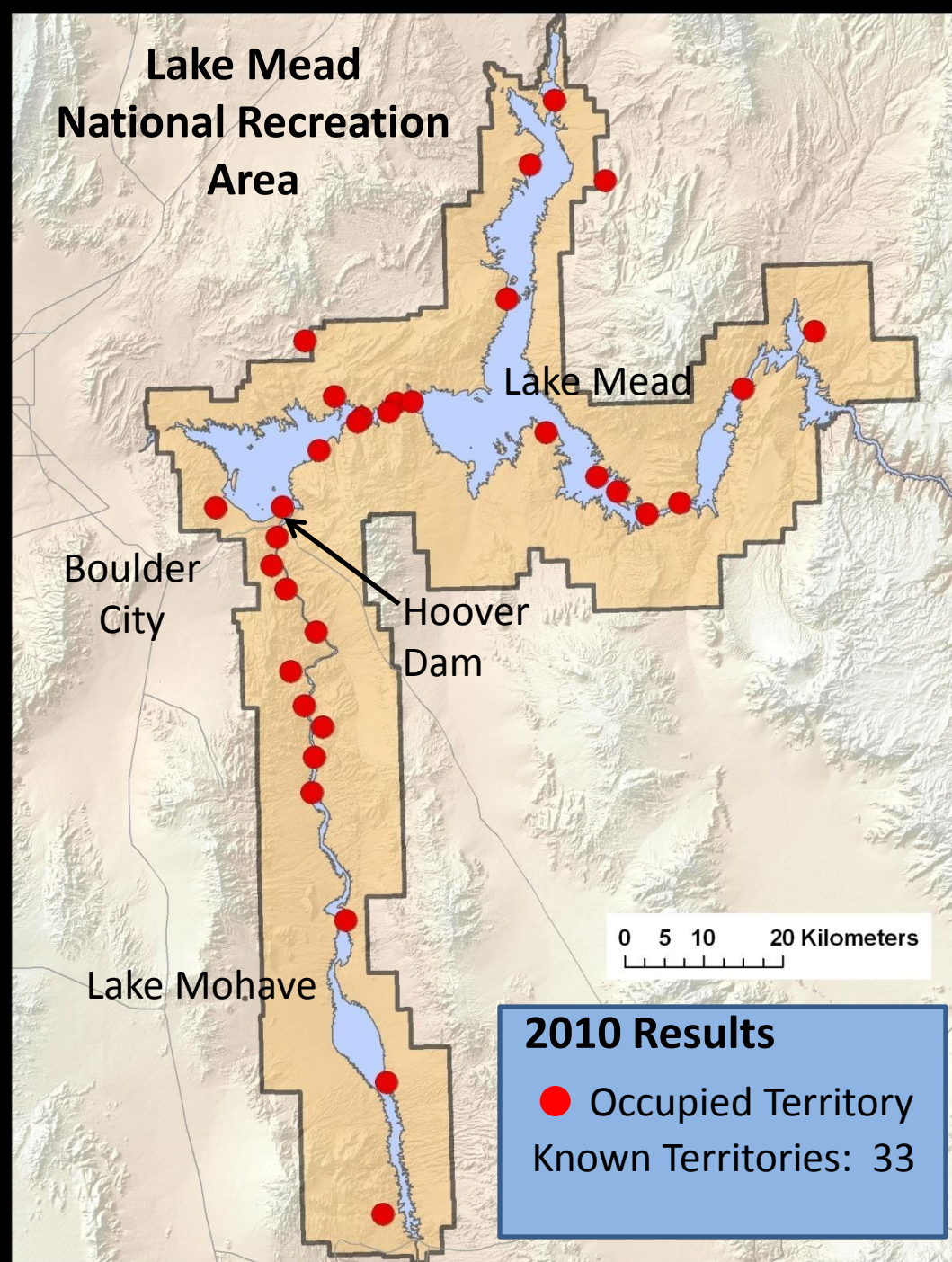
Number of Occupied Territories in Lake Mead NRA



Recent Distribution at Lake Mead NRA



* Occupied territory defined here as a territory with at least one resident adult



Peregrine Dietary Assessment: LMNRA



	Aquatic Bird	Terrestrial Bird
Prey Types*	29	38
Geometric Mean Mass (g)**	286	45
Frequency (%)	36.8	54.2
Biomass (%)	77.1	21.6

* 71 total prey types (2010)

** $F_{1,65} = 44.3, p < 0.0001$

Avian Prey: Hg Level by Bird Type



Prey Type	<i>n</i>	Mean Hg (ppm)*
Aquatic Bird	80	5.07 ± 0.84
Terrestrial Bird	257	0.76 ± 0.18

* Sig. diff. between prey types ($U = 16886$, $z = 8.69$, $P < 0.001$, $r = 0.47$)

87 species types tested

Peregrines: Hg by Study Area

	LMNRA			SNV		
	<i>n</i>	Hg (ppm)	Range	<i>n</i>	Hg (ppm)	Range
Adult Mean*	12	17.2 ± 4.1	1.5–42.5	5	2.7 ± 1.1	0.9–6.8
Brood Mean*	6	5.8 ± 2.1	0.8–13.1	3	0.7 ± 0.2	0.4–1.0
Prey Mean*§	8	2.4 ± 0.4	0.3–3.9	5	0.3 ± 0.1	0.1–0.4

* Sig. diff. by study area (Mann-Whitney tests; $P < 0.05$)

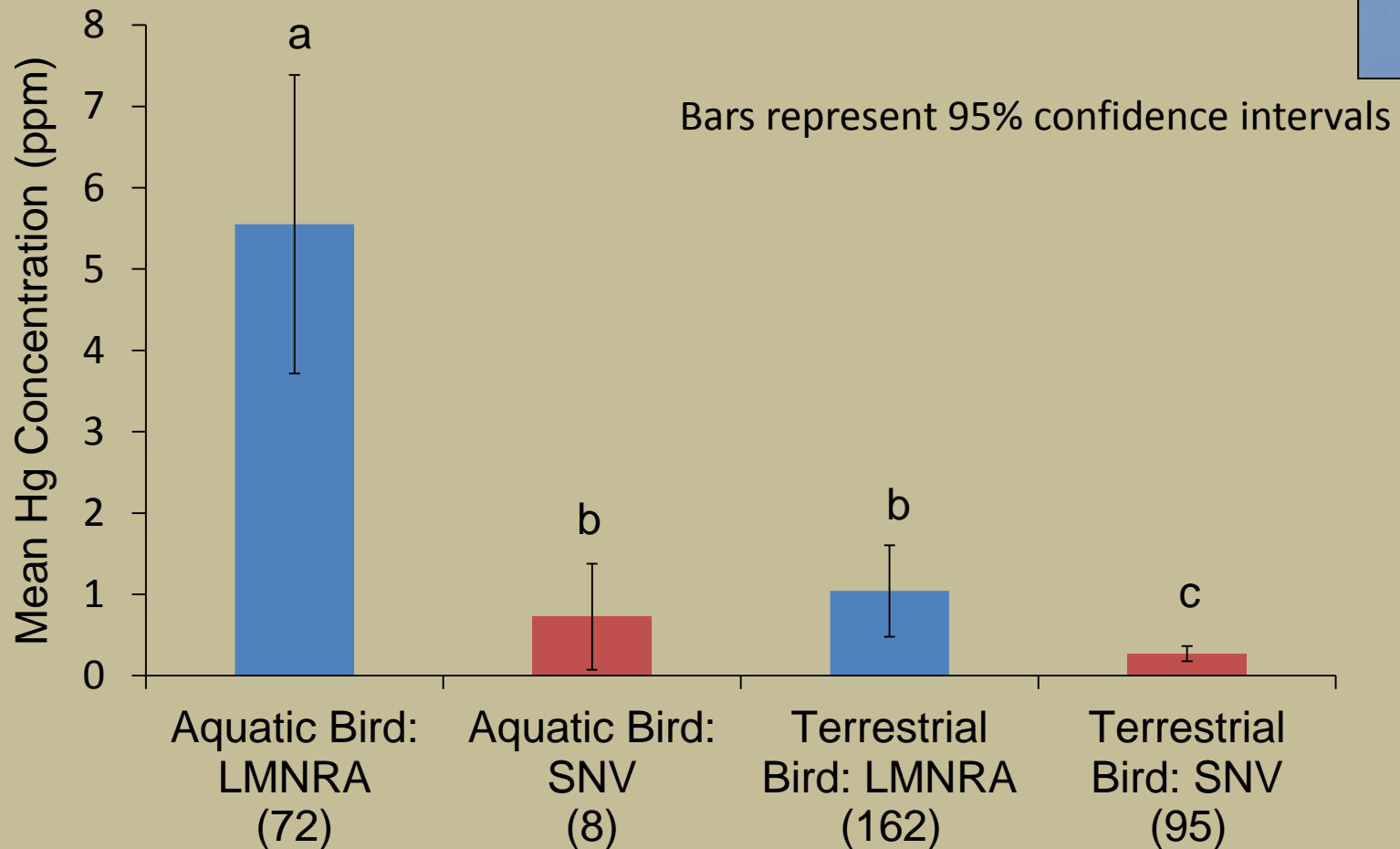
§ Mean number prey analyzed/territory: LMNRA = 69; SNV = 33

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	LMNRA	SNV
Median Distance to Water (km)	0.1	34.9
Aquatic Bird Prey Composition (%)	71.8	17.9
Terrestrial Bird Prey Composition (%)	28.0	82.1

Prey Type by Study Area



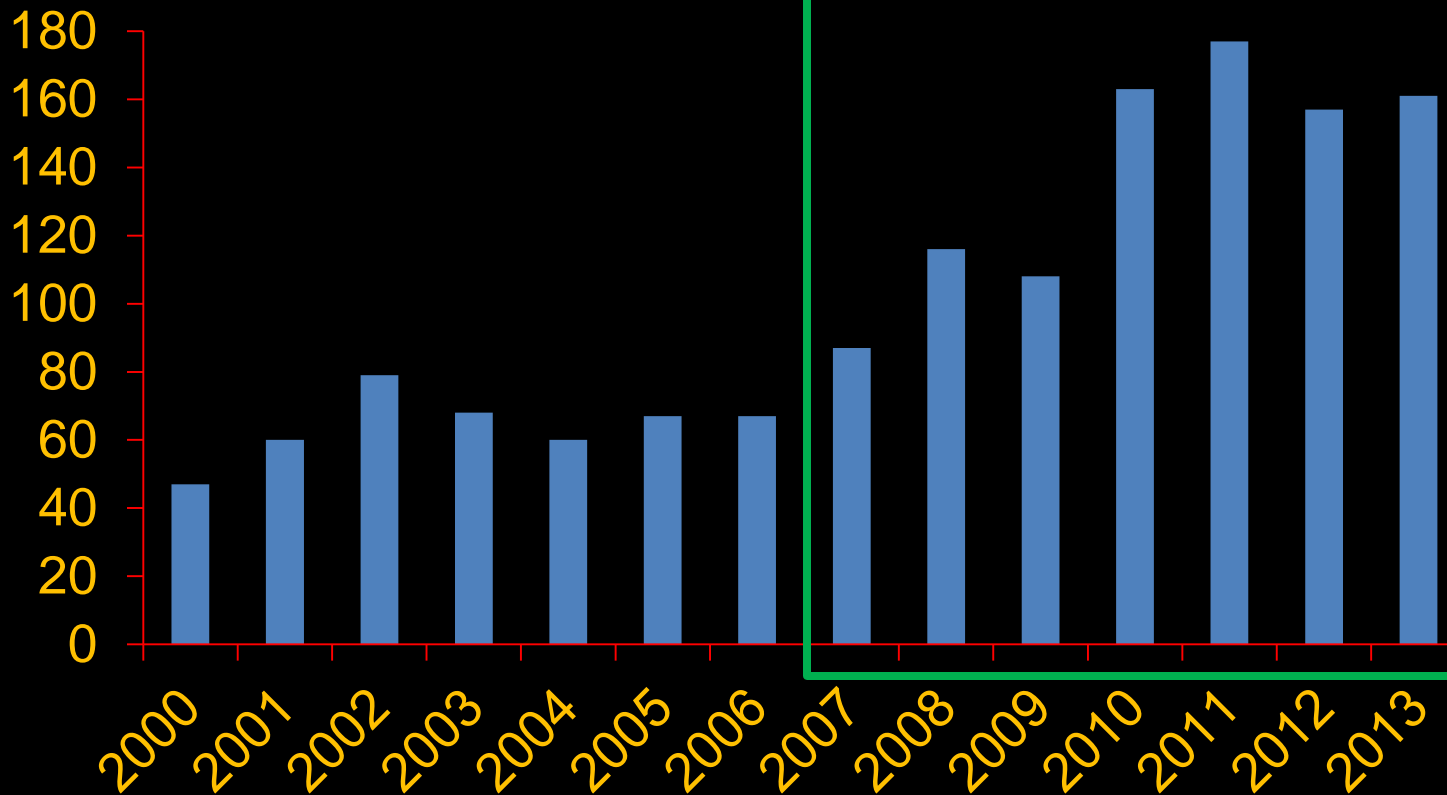
- Sig. diff. in Hg levels between groups ($H_3 = 96.4$, $n = 337$, $P < 0.001$)
- Group differences determined with stepwise comparisons

Future Needs

1. Mercury results presented at 2013 international Raptor Research Foundation with several calls for collaboration
2. Identify Hg point sources
3. Assess threats to human and wildlife health
4. Assess trends over time

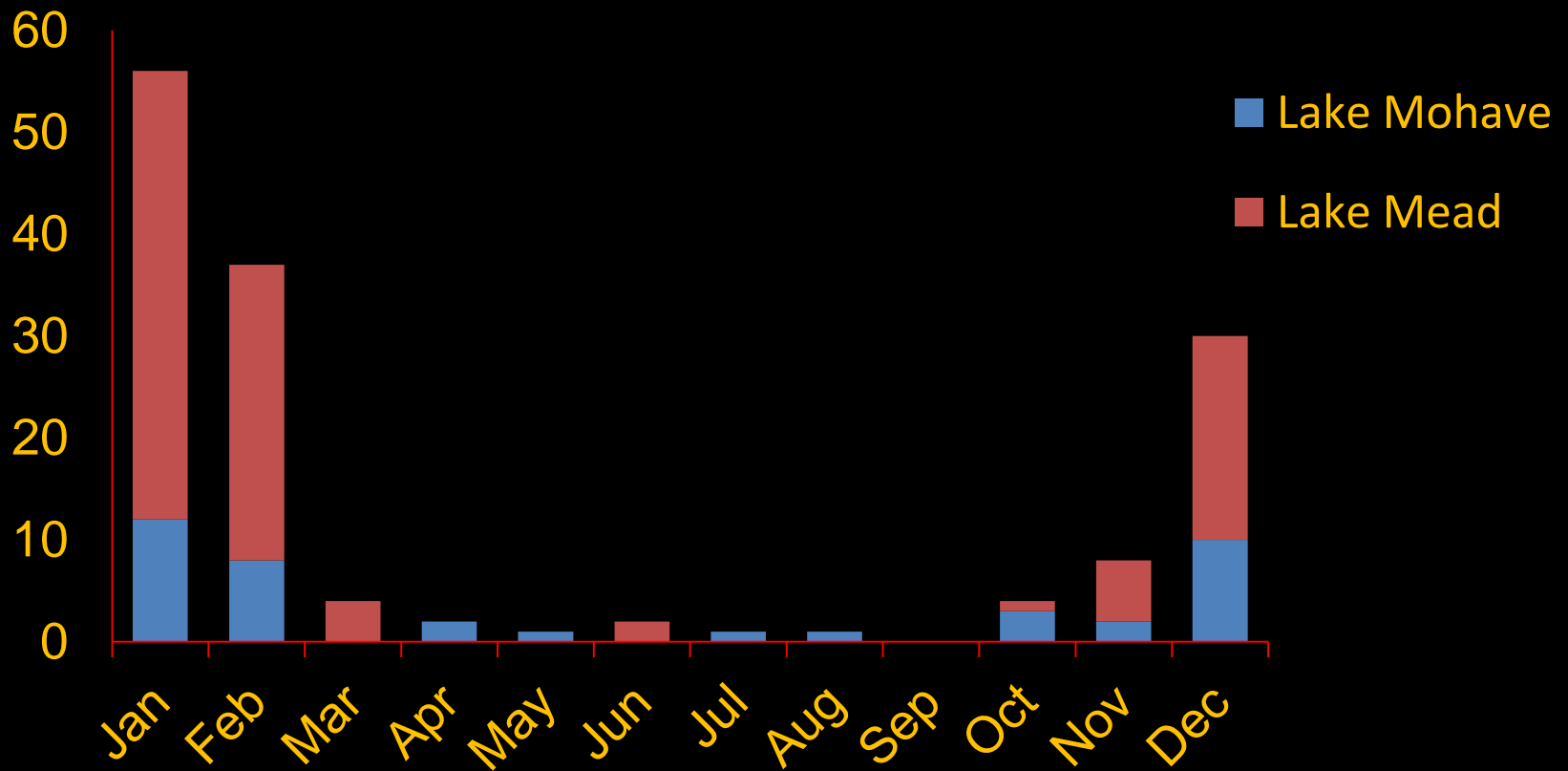


Bald Eagles: Mid-Winter Surveys



Norman 07

Bald Eagles: Monthly Occurrence (2004–2009)



Acknowledgments

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